Research Article

Outcome of labor in vertex malposition in Cameroon

Elie Nkwabong[1]*, Marie Foe Mba[2], Joseph Nelson Fomulu[1]

[1]Department of Obstetrics & Gynecology, Faculty of Medicine and Biomedical Sciences/University Teaching Hospital, Yaoundé, Cameroon
[2]Faculty of Medicine and Biomedical Sciences, Yaoundé, Cameroon

*Correspondence:
Dr. Elie Nkwabong,
E-mail: enkwabong@yahoo.fr

ABSTRACT

Background: Vertex malposition is associated with increased maternal and neonatal adverse effects, but its magnitude has not been well established in sub-Saharan women. This study aimed at evaluating labor outcome in cases of Vertex Malposition (VM) in Cameroon.
Methods: This prospective cohort study was conducted in the University Teaching Hospital of Yaoundé (Cameroon) from March 1st, 2013 to February 28th, 2014. Women carrying singletons with or without VM in labor were monitored during labor. The main variables recorded included the duration of the second stage of labor, mode of delivery, birth weight and neonatal wellbeing. Data of women with VM were compared to those of women without it. Fisher's exact test and t-test were used for comparison where appropriate. P<0.05 was considered statistically significant.
Results: A total of 100 women were recruited in each group. There was no difference in the mean birth weights (P=0.56). VM was significantly associated with prolonged second stage of labor (RR 12.1, 95%CI 4.4-33.1), cesarean section (RR 12.6, 95%CI 5.3-30), instrumental delivery (RR 7.7, 95%CI 2.6-22.3), episiotomy (RR 6.2, 95%CI 2.8-13.7) and neonatal death (RR 8, 95%CI 1.01-62.7).
Conclusions: VM is associated with increased maternal and neonatal adverse effects. Hence, delivery should be carried out in settings where cesarean section, instrumental delivery and neonatal resuscitation can rapidly be performed.

Keywords: Cameroon, Labor outcome, Maternal outcome, Neonatal outcome, Vertex malposition

INTRODUCTION

Vertex Malposition (VM) is defined as the orientation of the occiput not anteriorly, rather transversely or posteriorly.[1,2] Prevalence of Occipito-Posterior (OP) position in early stage of labor varies between 10 and 30%.[3-5]

Risk factors for VM include nulliparity, maternal obesity, excessive fetal weight, pelvic (especially mid cavity) immaturity or abnormalities, epidural anesthesia and labor augmentation.[2,6,7]

Diagnosis of OP position is done through a digital vaginal examination which finds the lambda fontanel towards the maternal sacrum. For Occipito-Transverse (OT) position, the lambda fontanel is situated at the maternal left or right sides. In advanced labor, there is frequent overlapping of fetal head sutures with the presence of caput succedaneum, thus, rendering the palpation of the fetal sutures and fontanels difficult. The diagnosis of VM in such difficult cases may be done through ultrasound scan.[5,7,8]

VM is associated with prolonged labor, labor stimulation, prolonged second stage of labor, uterine rupture, caesarean section, instrumental vaginal deliveries, genital

lacerations, post-partum hemorrhage from genital tract lacerations or from uterine atony (due to prolonged labor), chorioamnionitis and poor neonatal outcomes.[2,4,6,7,9,10] Hence, VM should be diagnosed early in labor for a close follow-up.

The OT position is usually a transitory position which under efficient uterine contractions may convert either to occipito-anterior (OA) or to OP positions. Under efficient uterine contractions, an OP position may also correct itself during labor with the delivery in OA position.[1,6] This is more common in multiparous than in primiparous women.[6] Around 5-11% of cases of malposition persist till delivery.[1,3,5,11]

Although instrumental vaginal deliveries are commoner in cases of VM, vacuum extraction is associated with higher failure rate than (Kielland's) forceps.[12,13] Manual rotation may correct the malposition.[10,14]

No recent study to our knowledge has evaluated the outcome of labor in cases of VM in sub-Saharan women. Hence, this study was aimed at evaluating labor outcome in such women.

METHODS

This prospective cohort study was conducted in the University Teaching Hospital of Yaoundé, Cameroon, from March 1st, 2013 to February 28th, 2014. All women carrying singletons with VM (OP or OT) diagnosed in labor, without any epidural anesthesia, were recruited. The location of the lambda fontanel was done via digital vaginal examination, by the obstetrician or by the resident in Obstetrics and Gynecology but confirmed by the obstetrician. When the lambda fontanel could not be accessed clinically, then a standard ultrasound scan was done to locate the occiput. For each woman with VM, a woman of the same parity carrying singleton without VM (OA position) who came in labor immediately after the one with VM was also recruited. An informed consent form was obtained from each woman. This study received approval from the ethics committee of the University Teaching Hospital of Yaoundé (Cameroon).

In our study, we wanted to know the socio-demographic and obstetrical parameters of women with VM as well as the variables that may permit the appreciation of labor outcome. The variables recorded on a questionnaire included maternal age and parity (number of deliveries after 28 complete weeks), the vertex position (OP, OT or OA), the duration of labor active phase (from 4 cm cervical dilatation to full dilatation), the duration of the second stage of labor (from full dilatation to delivery of the fetus), the mode of delivery, labor augmentation (with oxytocin when the uterine contractions were less than 3/10 minutes or lasted less than 40 seconds each), the birth weight, the Apgar score and obstetrical lacerations. Vaginal examinations were done every two hours when

the cervical dilatation was <8 cm and hourly when it was ≥8 cm.

The calculated sample size was at least 81 women in each group, using the following formula $N = 2 \times (Z\alpha + Z\beta / P_0 - P_1)^2 \times P \times (1-P)$ where $Z\alpha = 1.65$ corresponds to a type I error of 5%, $Z\beta = 1.28$ corresponds to a type II error of 10% or a power of 90%, P_0 the assumed prevalence of instrumental delivery in women with VM (22%), P_1 the assumed prevalence of instrumental delivery in women without VM (6%) and P is $(P_0 + P_1)/2$. Data were analyzed using Epi info 3.5.4. Data of women with VM were compared to those of women with OA position. Fisher's exact test was used to compare categorical variables and t-test to compare continuous variables. P<0.05 was considered statistically significant.

RESULTS

One hundred women in labor with singletons in vertex presentation were diagnosed with VM out of 1886 deliveries, giving an incidence of 5.3%. It included 65 cases (3.4%) of OP and 35 cases (1.9%) of OT. The same number of women (100) without VM were recruited.

VM occurred in 51 nulliparous women (51%), in 33 (33%) women of parity 1 to 2, in 11 (11%) women of parity 3 to 4 and in five (5%) women of parity ≥5. The same parity distribution was observed in the OA group since this was a matched cohort study.

A total of 63 women (63%) with VM were received when the cervix was dilated at 4 cm or less as against 72 women (72%) without VM.

Socio-demographic and obstetrical data are compared in Table 1: [maternal age (NS), birth weight (NS), labor augmentation (P<0.05), duration of active phase (P<0.05), duration of 2nd stage (P<0.05), cesarean section (P<0.05), episiotomies (P<0.05), instrumental deliveries (P<0.05), mean 5 minute APGAR score (P<0.05), neonatal death at 5 min (P<0.05)].

The duration of the active phase (4 to 10 cm) varied between 3 and 15 hours with a mean of 8.4 ± 2.7 hours in the VM group (n=63) as against a range from 2 to 10 hours with a mean of 5.3 ± 1.7 hours in women without VM (n=72) (P<0.0001). Relative risk for active phase lasting ≥6 hours in the VM group was 1.4, 95%CI 1.2-1.7, P<0.0001 (58/63 cases in the VM group and 45/72 in women without VM).

The duration of the second stage of labor in women with successful vaginal delivery (from full dilatation to delivery of the fetus) varied between 10 and 180 minutes with a mean of 75.6 ± 40.7 min in the VM group (n=34) as against a range from 10 to 120 min with a mean of 32.6 ± 18.0 min in women without VM (n=87) (P<0.0001). Two of the 36 women in the VM group and eight of the 95 women without VM who had vaginal

delivery came at full dilatation, hence, the total length of the second stage could not be accessed. Relative risk for second stage lasting more than 60 minutes in the VM group was 12.1, 95%CI 4.4-33.1, P<0.0001 (19 cases/34 in the study group as opposed to four cases/87 in the control group).

Table 1: Socio-demographic and obstetrical data distribution among both groups.

Variables	Group with VM	Group with OA position	RR	95%CI	P value
Number of women	100	100			
Maternal age (years)	26.6 ± 5.3 (18-40)	26.1 ± 5.1 (16-40)			0.49
Parity	1.0 ± 1.4 (0-6)	1.0 ± 1.4 (0-6)			1
Labor augmentation	46/100 (46%)	24/100 (24%)	1.9	1.2-2.8	0.0017
Cesarean section	63/100 (63%)	5/100 (5%)	12.6	5.3-30	<0.0001
Mediolateral episiotomy	17/37 (45.9%)	7/95 (7.4%)	6.2	2.8-13.7	<0.0001
Instrumental deliveries	12/37 (32.4%)	4/95 (4.2%)	7.7	2.6-22.3	0.0001
Perineal tears*	6/37 (16.2%)	17/95 (17.9%)	0.9	0.3-2.1	1
Birth weights (gm)	3455.2 ± 421.8 (2600-4700)	3421.4 ± 401.1 (2639-4600)			0.56
Mean 5 min APGAR score	8.5 ± 2.1 (0-10)	9.5 ± 1.1 (0-10)			<0.0001
5 min Apgar score <7	7/100 (7%)	1/100 (1%)	7	0.8-55.8	0.06
Neonatal death at 5 min	8/100 (8%)	1/100 (1%)	8	1.0-62.7	0.034

VM: Vertex malposition, OA: Occipito-anterior, RR: Relative risk, CI: Confidence intervals, *1st and 2nd degrees perineal tears.

Cesarean deliveries were carried out in 63 cases (63%) in the VM group (22/35 or 62.8% in the OT subgroup and 41/65 (63.1%) in the OP subgroup) as compared to five women (5%) without VM. The main indications for cesarean section were cephalopelvic disproportion (CPD) and Acute Fetal Distress (AFD) (Table 2).

Table 2: Indications for cesarean section in the two groups.

Indications	Group with VM N (%)	Group with OA position N (%)
CPD	49 (77.7)	3 (60)
AFD	9 (14.5)	1 (20)
Scarred uterus	3 (4.7)	0 (0)
Uterine pre-rupture syndrome	1 (1.6)	1 (20)
Cervical dystocia	1 (1.6)	0 (0)
Total	63 (100)	5 (100)

VM: Vertex malposition, OA: Occipito-anterior, CPD: Cephalopelvic disproportion, AFD: Acute fetal distress

Successful vaginal delivery occurred in 37 cases (37%) in the VM group as against 95 (95%) in women without VM. Twenty women (20%) in the VM group (seven/65 or 10.7% in OP and 13/35 or 37.1% in OT) delivered vaginally with the fetal occiput orientated anteriorly while 17/65 fetuses (26.1%), all of the OP subgroup, had vaginal delivery with the fetal occiput orientated posteriorly.

Of the 65 cases of OP, 58 persisted at the time of delivery (41 at cesarean section and 17 at vaginal delivery), giving an 89.2% rate of persistent OP position and a 29.3% rate (17/58) of successful vaginal delivery in cases of persistent OP position. When we considered the total number of deliveries, the rate of OP position at delivery was 3.0% (58/1886).

The indications for mediolateral episiotomies in the VM group were instrumental deliveries (all forceps deliveries) (12 cases) and imminent perineal tears (five cases), while in women without VM the indications for episiotomy were instrumental deliveries (two forceps and two vacuum extractions) and imminent perineal tear (three cases). The indications for instrumental deliveries are shown in Table 3.

Table 3: Vaginal instrumental deliveries rates and indications in both groups.

Indications	Group with VM N (%)	Group with OA position N (%)
Prolonged second stage	9 (24.3)	3 (3.2)
AFD	3 (8.1)	1 (1.0)
Total of ID	12/37 (32.4)	4/95 (4.2)

VM: Vertex malposition, OA: Occipito-anterior, AFD: Acute fetal distress, ID: Instrumental deliveries

Mean birth weight of babies delivered vaginally in the VM group was similar to that of babies without VM (3422.7 vs. 3409.8 g) while the mean birth weight of babies delivered by cesarean section in the VM group was 175 g lower than that delivered by cesarean section among women without VM (3483.1 ± 376 g vs. 3658 ± 453.7 g), though not statistically significant (P=0.32).

Poor 5 minute APGAR score was observed frequently when there was fetal distress or prolonged second stage. The neonatal deaths were observed mainly in newborns with acute fetal distress during delivery. No maternal death occurred during the study period.

DISCUSSION

Our rate of VM in labor (5.3%) is lower than that of 10-30% reported elsewhere[3-5], but that of persistent Occipito-Posterior (OP) position (89.2%) is higher than the rates of 1.8% to 10.8% found by others.[1,6,15] Because of low spontaneous rotation rate, our rate of persistent OP position at delivery (3.0%) is within the range of 1.8% to 6.0% found elsewhere.[6,11,15]

In our series, women with VM were usually nulliparous (51%) as noticed elsewhere.[6,16] This might be explained by the fact that some of these nulliparous women might have had a borderline pelvis which is a known risk factor for VM.[7]

The majority of our women (65%) were aged between 20 and 29 years as noticed in Nigeria.[16] This might be due to the fact that most of our women in this age group were nulliparous.

Labor augmentation in our series was commoner in the VM group (RR 1.9) as noticed by other researchers.[6,15,16] This might be due to the fact that more uterine contractions are necessary for fetal head molding to take place, for stretch of maternal soft tissues and for spontaneous rotation to OA position. Active phase of labor was more prolonged in the VM group (P<0.001). This is similar to the findings of other researchers.[6,7,9,15,16] This is explained by the fact that spontaneous rotation of the occiput to the anterior position need more efficient uterine contractions and, hence, more time.

Second stage was also more prolonged in the VM group as observed elsewhere.[6,9,15] This can be explained by the fact that when spontaneous anterior rotation did not occur, there was a loss of flexion of the fetal head with the occipito-frontal diameter (11.0-11.5 cm) rather than the suboccipito-bregmatic diameter (9.5 cm) engaging in the maternal pelvis. Indeed, at mid pelvis, there is usually a certain degree of deflexion because the occiput against the sacrum does not maintain the same automatic flexion as when it descends along the pubic plane. Consequently, the fetal head needed more molding, hence, more time to be delivered. Moreover, there is need of sufficient time for maternal soft tissues to achieve enough stretch to be able to increase the pelvic capacity. Some authors found that stretch of pelvic floor muscles was higher in FM than in normal position.[17]

In our study, only 20 women (20%) with FM had a spontaneous anterior rotation of the fetal occiput (13/35 for OT and 7/65 for OP position). This rate is lower than that of 89.1% to 93% found elsewhere.[1,3] The low rate of spontaneous rotation in our series might show that the pelvis of sub-Saharan women might not be favorable enough for spontaneous rotation. More studies are needed in other sub-Saharan countries to confirm these findings.

The rate of CS in our study (63%) is higher than the rates of 22-44% reported by other authors.[1,4,6] Cephalopelvic disproportion (CPD) rate in our series (77.8%) was similar to the rate of 78% reported by some authors.[6] The diagnosis of CPD was done when the descent of the fetal head remained between 5/5 and 3/5 one hour after full cervical dilatation with irreducible overlapping of fetal head sutures. This is explained by the fact that the diameter of the presenting fetal head in OP position is bigger (11.0-11.5 cm), increasing the risk of CPD given that increased fetal head is associated with increased risk of CPD. Moreover, in OT position, this diameter is bigger than that of the mother's interspinous diameter (around 10cm). Hence, vaginal delivery without internal rotation is impossible.

Our rate of successful vaginal delivery in cases of persistent OP (29.3%) is lower than that of 40% found by some researchers.[15] Even when vaginal deliveries occurred in the VM group, they needed more instrumental deliveries (RR 7.7), as noticed by some authors.[4,6] Our rate of instrumental vaginal deliveries (32.4%) was slightly higher than the rates of 24-26% observed by the same authors. This is explained by the fact that since the diameter of the presenting fetal head was bigger, the fetal head could be arrested in the maternal pelvis and could favor prolonged second stage. The injuries to the fetal head might have led to acute fetal distress.

Mediolateral episiotomies were frequent in the VM group even when instrumental deliveries were not carried out (5/25 versus 3/91). This has been noticed by some authors.[6,7,9] This is due to the fact that the diameter of the fetal head that was distending the perineum (11.0-11.5 cm) was bigger than the 9.5 cm and led to imminent perineal tears. Nevertheless, perineal tears when episiotomies were not done were similar in both groups and were usually first degree tears.

The fact that mean birth weight of babies delivered by CS (mainly for CPD) in the VM group was 176 g lower than those of babies without VM can be explained by the fact that VM is associated with a bigger presenting diameter, thus, CPD can occur frequently while in OA position (normal position), the presenting diameter is normal, thus CPD will occur only with excessive fetal weight.

Neonates born in the VM group had poorer (<7) 5 minute APGAR score (RR 7). This could be attributed to increased rate of prolonged labor, instrumental deliveries and acute fetal distress. These reasons explain the higher risk of neonatal death within 5 minutes observed in this group (RR 8). This has been observed elsewhere.[6,9,10] For prevention or correction of VM, more studies, such as specific maternal positions to be adopted during labor, should be carried out especially among the sub-Saharan women, given the poor maternal and neonatal outcomes associated with VM.

Some limitations of our study are due to the fact that we did not follow up the newborns up to one month after delivery to have both the early and late neonatal death rates.

VM in labor is associated with increased maternal and neonatal adverse effects. Henceforth, when VM is diagnosed, delivery should be carried out in settings where cesarean section, instrumental delivery and neonatal resuscitation can rapidly be performed.

REFERENCES

1. Adam G, Sirbu O, Voicu C, Dominic D, Tudorache S, Cernea N. Intrapartum ultrasound assessment of fetal head position, tip the scale: natural or instrumental delivery? Curr Health Sci J. 2014;40(1):18-22.
2. Haeri S, Baker AM. Estimating the impact of pelvic immaturity and young maternal age on fetal malposition. Arch Gynecol Obstet. 2012;286(3):581-4.
3. Guittier MJ, Othenin-Girard V. Correcting occiput posterior position during labor: the role of maternal positions [French]. Gynecol Obstet Fertil. 2012;40(4):255-60.
4. To WW, Li IC. Occipital posterior and occipital transverse positions: reappraisal of the obstetric risks. Aust N Z J Obstet Gynaecol. 2000;40(3):275-9.
5. Malvasi A, Tinelli A, Barbera A, Eggebø TM, Mynbaev OA, Bochicchio M, et al. Occiput posterior position diagnosis: vaginal examination or intrapartum sonography? A clinical review. J Matern Fetal Neonatal Med. 2014;27(5):520-6.
6. Fitzpatrick M, McQuillan K, O'Herlihy C. Influence of persistent occiput posterior position on delivery outcome. Obstet Gynecol. 2001;98(6):1027-31.
7. Martino V, Iliceto N, Simeoni U. Occipito-posterior fetal head position, maternal and neonatal outcome. [Italian]. Minerva Ginecol. 2007;59(4):459-64.
8. Ridley RT. Diagnosis and intervention for occiput posterior malposition. J Obstet Gynecol Neonatal Nurs. 2007;36(2):135-43.
9. Senécal J, Xiong X, Fraser WD. Effect of fetal position on second-stage duration and labor outcome. Obstet Gynecol. 2005;105(4):763-72.
10. Kopas ML. A review of evidence-based practices for management of the second stage of labor. J Midwifery Women's Health. 2014;59(3):264-76.
11. Yancey MK, Zhang J, Schweitzer DL, Schwarz J, Klebanoff MA. Epidural analgesia and fetal head malposition at vaginal delivery. Obstet Gynecol. 2001;97(4):608-12.
12. Tempest N, Hart A, Walkinshaw S, Hapangama DK. A re-evaluation of the role of rotational forceps: retrospective comparison of maternal and perinatal outcomes following different methods of birth for malposition in the second stage of labor. BJOG. 2013;120(10):1277-84.
13. Wanyonyi SZ, Achila B, Gudu N. Factors contributing to failure of vacuum delivery and associated maternal/neonatal morbidity. Int J Gynaecol Obstet. 2011;115(2):157-60.
14. Graham K, Phipps H, Hyett JA, Ludlow JP, Mackie A, Marren A, et al. Persistent occiput posterior: outcomes following digital rotation: a pilot randomised controlled trial. Aust N Z J Obstet Gynaecol. 2014;54(3):268-74.
15. Ponkey SE, Cohen AP, Heffner LJ, Lieberman E. Persistent fetal occiput posterior position: obstetric outcomes. Obstet Gynecol. 2003;101(5 Pt 1):915-20.
16. Briggs ND. Outcome of labor in occipito posterior position in an African population. Br J Obstet Gynaecol. 1989;96(10):1234-6.
17. Parente MP, Jorge RM, Mascarenhas T, Fernandes AA, Martins JA. The influence of an occipito-posterior malposition on the biomechanical behavior of the pelvic floor. Eur J Obstet Gynecol Reprod Biol. 2009;144(Suppl 1):S166-9.